REMARKS

I. INTRODUCTORY REMARKS

Reconsideration and allowance are respectfully requested.

The applicants appreciate the Examiner's examination to date including the personal interview held on October 30, 2006 and the constructive discussion. The applicants have reviewed the PTOL-413 form, and if the Examiner believes further documentation is needed, a telephone call with the undersigned is respectfully requested. The applicants stress that the interview represented an exploratory discussion and should not constitute a binding event on the claims or the applicant. The two documents provided to the Examiner at the interview are included herewith.

Before this Amendment, claims 1-97 were pending. Claims 1-3, 6-57, 59-73, and 79-82 stood rejected. Claims 4-5, 58, 74-78, and 83-97 were withdrawn.

After the present Amendment, claims 1-3, 6-13, 16-39, 40-47, 49-50, and 66-73 are pending and stand rejected.

After this Amendment, the independent claims are 1, 40, 47, and 66.

The applicants disagree with the Examiner's position on the withdrawn claims and statements on restriction but do not further comment on these issues in this Amendment in order to more efficiently advance prosecution.

In particular, the applicants have executed the following amendments:

Independent claim 1 is amended so as to incorporate the subject matter of former dependent claim 15, and dependent claim 15 has been cancelled. Also, independent claim 1 has been amended to recite that the material coats the tip. Support for this amendment can be found throughout the specification, claims, and drawings including, for example, page 6, lines 19-20 ("...wherein the tip is coated with a patterning compound...") and Figures 4-8.

Independent claim 40 has been amended to focus on "additive repair." Support for this amendment can be found throughout the specification, claims, and drawings including, for example, page 6, line 17.

Independent claim 47 has been amended to focus on "additive repair" and "atomic force microscope" embodiments. Support for this amendment can be found throughout the

specification, claims, and drawings including, for example, page 6, line 17, as well as Figures 1-2. See also original claim 48.

Independent claim 66 has been amended to focus on the embodiment for use with a "tip coated with one or more patterning compounds." Support for this amendment can be found throughout the specification, claims, and drawings including, for example, page 6, lines 19-20 ("...wherein the tip is coated with a patterning compound...") and Figures 4-8.

Claims 51-60, 61-65, and 81-82 are cancelled without prejudice merely to reduce the issues. The applicants reserve the right to pursue these claims later in prosecution in this or a related case.

New dependent claims 98-101 are introduced for an embodiment wherein voltage bias is not applied. Support for these new claims can be found throughout the specification and working examples wherein the additive repair is executed, both as expressly described and as inherently true, without application of voltage bias between tip and substrate. Example 17 at page 28 describes an embodiment wherein voltage bias is applied, so the specification clearly and expressly describes both embodiments wherein voltage is applied and embodiments wherein voltage is not applied.

II. OBJECTIONS AND INFORMALITIES

The applicants acknowledge the Examiner's comments on the IDS filings and have corrected the typographical error in the specification at page 4 to provide the correct patent number.

The applicants acknowledge the Examiner's position on the drawings (in particular, Figures 1, 3a, 3b, 19, 21, and file amended drawings herewith.

The applicants particularly note Figures 3A and 3B which are discussed at pages 15-16 in the specification. The number 4 has been deleted from Figure 3B. The specification text discussion clarifies that 4 is for the right probe. The number 5 represents an ink which can coat 4.

The applicants acknowledge the Examiner's position on the minor, typographical errors noted on pages 5-6 of the office action for the specification and abstract. These have been corrected, and a new Abstract sheet is filed herewith.

The applicants acknowledge the Examiner's objection to claims 81-82 and have taken corrective action.

The applicants acknowledge the Examiner's rejection of claims 37-39 for improper dependency and have taken correction.

The applicants will next address prior art anticipation and obviousness issues. The applicants have organized the response based on the independent claims. For the obviousness issues, the applicants will first describe differences between the single references against the claims, and then describe the combined teachings and failure for motivation to combine references. For clarity, the references are cited by name:

Cohen, USP 5,865,978

Yedur, USP 6,197,455

Bard, USP 4,968,390

Lewis, *Applied Physics Letters*, 75, 17, 2689 (October 25, 1999)

Miller, USP 6,270,946

Park, 5,871,869

Hattori, US Patent Publication 2002/0086223

III. RESPONSE TO ANTICIPATION REJECTIONS

In view of the present amendments, the applicants believe that no anticipation issue remains.

A. Claims 1-39

Independent claim 1 has been amended so that the subject matter of former claim 15 has been added and also so that the tip is a coated tip. Because claim 15 was not found to be anticipated, the anticipation rejection for independent claim 1, and all claims dependent thereon, should be withdrawn. The applicants stress that a variety of additional reasons may exist for the lack of anticipation which go beyond what the Examiner recited in the Office Action.

B. Claims 40-46

Independent claim 40 has been amended so as to include "additive repair." Before this Amendment, independent claim 40 was rejected for anticipation based on only one reference, Lewis. Lewis, however, does not teach or suggest additive repair. Rather, Lewis

merely teaches an etching process which is subtractive repair, not additive repair. Hence, this anticipation rejection on claim 40, and all claims dependent thereon, should be withdrawn. The applicants stress that a variety of reasons may exist for the lack of anticipation which go beyond what the Examiner recited in the Office Action.

C. Claims 47-50

Independent claim 47 has been amended to include the subject matter of claim 48 for an AFM tip. Claim 48 was held to be anticipated only by Lewis. However, independent claim 47 has also been amended to include "additive repair." Lewis, however, does not teach or suggest additive repair. Rather, Lewis merely teaches an etching process which is subtractive repair, not additive repair. Hence, this anticipation rejection for claim 47, and all claims dependent thereon, should be withdrawn. The applicants stress that a variety of reasons may exist for the lack of anticipation which go beyond what the Examiner recited in the Office Action.

D. Claims 66-73

Independent claim 66 has been amended to recite use of tips which are coated with patterning compound.

The Examiner rejected claim 66 as anticipated by Cohen, Bard, or Lewis. However, Cohen and Bard do not teach tips coated with patterning compound. Moroever, Lewis does not describe forming structures at least 10 nm high. Rather, Lewis describes a subtractive process, not a building up process. Hence, independent claim 66, and all claims dependent thereon, is not anticipated, and this anticipation rejection should be withdrawn. The applicants stress that a variety of reasons may exist for the lack of anticipation which go beyond what the Examiner recited in the Office Action.

IV. RESPONSE TO OBVIOUSNESS REJECTIONS

In a series of obviousness rejections, the Examiner has raised seven references against the claims including four "primary" references (Cohen, Yedur, Bard, and Lewis) and three "secondary" references (Miller, Park, and Hattori). Park appears to be cited only for its sol-gel teachings, and Hattori for its nanoparticle teachings. Park and Hattori appear to be cumulative at best to the other five references. Hence, Park and Hattori are only discussed in the context of claims which recite sol-gel or nanoparticles, respectively. The large number of

references is indicative that prima facie obviousness is not present. One of ordinary skill in the art can only combine such a large number of references with aid of impermissible hindsight.

The application relates generally to improved photomask repair, particularly wherein materials are added to the mask. See pages 1-6 of specification for background discussion with focus on the need for better additive repair methods.

A. Independent Claim 1 and Claims 1-39

Independent claim 1 as presently amended (former claim 15) was rejected in the office action at pages 12-14 as being obvious over either Cohen, Yedur, or Bard in view of either Lewis or Miller. The applicants respectfully traverse. The applicants first focus on the independent claim 1.

The applicants agree with the Examiner's statement that the primary references Cohen, Yedur, and Bard do not "specifically teach the use of an AFM tip." However, large differences in structure and function exist between the cited references and the claims. Hence, prima facie obviousness is not present.

The inventors faced a problem with providing a better method for additive mask repair. Claim 1 recites depositing material from a coated tip to a defective mask. The deposition material is a material different from the tip material itself or the surrounding materials of the environment apart from the tip and substrate. An advantage of the presently claimed invention is that a wide variety of materials can be coated onto the tip and deposited, and the material is not limited to the tip material itself or a material which can be put in the surrounding materials of the environment.

The functional and structural differences between the claim and the individual references are large and represent a difference in kind.

Cohen describes a different approach which is called an electrochemical paint brush approach. However, Cohen has material deposit from an electroplating solution surrounding the tip and substrate, not from a coated tip. See for example column 12, lines 61-68 and column 13, lines 3-12 ("...copper started coming out of solution."). An AFM tip is not used.

Like Cohen, Yedur describes an approach which requires voltage bias be used between tip and substrate. Deposited material comes from a gas surrounding the tip, not from the coated tip. Yedur does not describe an AFM tip.

Like Cohen and Yedur, Bard describes an approach requiring voltage bias. Deposited material comes from a preexisting film, not from a coated tip.

Lewis describes a chrome etch method which is subtractive repair, not additive repair. Moreover, Lewis does not describe an AFM tip but describes cantilevered micropipettes.

Finally, Miller does not describe anything teaching or suggesting additive mask repair for a defective mask. Miller consistently teaches away from anything associated with a photomask ("An object of the present invention is to provide a method to directly fabricate nanoscale electronic devices without using a mask." col. 1, lines 43-45). Miller is a "paper patent" with no working examples. Miller only suggests technology focused on depositing difunctional molecules. Nothing in the record enables or suggests one to repair masks additively with difunctional molecules.

In addition, no motivation is present to combine references. Cohen, Yedur, and Bard describe voltage bias approaches to surface modification which would be destroyed and rendered inoperable by use of non-voltage bias approaches as described by Lewis and Miller. Cohen, Yedur, and Bard do not describe use of coated tips, as does Lewis and Miller. The approaches are fundamentally different.

The Examiner has stated that "..an AFM probe tip can be used with a non-conductive substrate." (page 14). However, Cohen, Yedur, and Bard do not work with a non-conductive substrate. This is strong evidence for motivation NOT to combine references.

Cohen, Yedur, and Bard each use different approaches, even though they each use voltage biasing. Cohen uses an electroplating solution. Yedur uses a gaseous atmosphere. Bard uses a preexisting film. Hence, one of ordinary skill would not combine Cohen, Yedur, and Bard.

The secondary references, Lewis and Miller, teach and suggest nothing about additive mask repair. The Lewis disclosure for subtractive repair actually teaches away from additive repair. Hence, one of ordinary skill facing a problem for additive mask repair would not turn to these references.

In sum, only hindsight results in the combination of these references, and prima facie obviousness is not present.

The Examiner has also cited Park and Hattori. However, Park appears to be cited for sol-gel claims and Hattori for nanoparticle claims. Hence, neither reference appears to be relevant to claim 1 as these two references are at best cumulative to the five references which were cited and distinguished above. Neither reference describes or suggests a tip-based approach to additive photomask repair.

Claim 26 recites sol-gel, and it appears from the office action that the Examiner deems Park relevant to claim 26. However, Park teaches only mask fabrication. Park does not teach or suggest mask repair. Park does not teach or suggest a tip-based approach to mask repair. Park does not teach or suggest a coated tip approach to additive mask repair. In Park, sol-gel is not essential to the invention, but rather can be substituted for chemical vapor deposition (col. 3, lines 15-30 and claims 4 and 5). Chemical vapor deposition is completely different from and would render inoperable the tip-based approaches of the primary reference. One of ordinary skill in the art would not combine Park with other references which focus on a tip-based approach for mask repair. Hence, no motivation is present to add Park to the prior mix of references. In sum, prima facie obviousness is not established by resort to Park.

Claim 28 recites nanoparticles, and it appears from the office action that the Examiner deems Hattori relevant to claim 28. However, Hattori teaches only mask fabrication. Hattori, moreover, does not teach mask repair. Hattori does not teach a tip-based approach to mask repair, or a coated tip approach to additive mask repair. Again, Hattori does not teach or suggest mask repair. One of ordinary skill in the art would not combine a teaching like Hattori that renders inoperable the tip-based approaches of the primary references. Hence, no motivation is present to add Hattori to the prior mix of references. In sum, prima facie obviousness is not established by resort to Hattori.

B. Claims 40-46

The Examiner has rejected claim 40 as obvious over the five references: Cohen, Yedur, Bard, Lewis, and Miller. Again, the applicants do not believe that the Examiner's resort to Park and Hattori is relevant to claim 40 and that these two references are cumulative.

No prima facie obviousness is present against claim 40 for reasons largely parallel to those discussed above with respect to claim 1. No motivation to combine references is present.

The discussion about Park above for claim 26 and sol-gel embodiments also applies to dependent claim 43.

C. Claims 47-50

The Examiner has rejected claim 47 as obvious over the five references: Cohen, Yedur, Bard, Lewis, and Miller. Again, the applicants do not believe that the Examiner's resort to Park and Hattori is relevant to claim 47 and that these two references are cumulative.

No prima facie obviousness is present against claim 47 for reasons largely parallel to those discussed above with respect to claim 1. No motivation to combine references is present.

The discussion about Park above for claim 26 and sol-gel embodiments also applies to dependent claim 50.

D. Claims 66-73

The Examiner has rejected claim 66 as obvious over the five references: Cohen, Yedur, Bard, Lewis, and Miller. Again, the applicants do not believe that the Examiner's resort to Park and Hattori is relevant to claim 66 and that these two references are cumulative.

No prima facie obviousness is present against claim 66 for reasons largely parallel to those discussed above with respect to claim 1. No motivation to combine references is present.

The discussion about Park above for claim 26 also applies to dependent claim 73.

V. CONCLUDING REMARKS

While the applicants have focused herein on the patentability of the independent claims, the applicants request that the Examiner also as needed separately consider the patentability of the dependent claims. In particular, the applicants respectfully request consideration of new dependent claims 98-101, as the prior art primary references are voltage bias approaches which is in stark contrast to these claims.

If the Examiner has any questions or comments about the present Amendment, he is invited to contact the undersigned to efficiently resolve any issues.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 CFR §§ 1.16-1.17, or any other provision, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

Respectfully submitted,

Date November 8, 2006 By _____

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